REMARKS

Reconsideration is requested.

Claims 1, 3, 4, 9, 10, 25, 27, 28, 33 and 34 are pending.

The Section 103 rejection of claims 1, 3, 4, 9, 10, 25, 27, 28, 33 and 34 over Basel (WO 98/36084) and Zhou (Mol. Gen. Genet. 248:318-328, 1995), is traversed. Reconsideration and withdrawal of the rejection are requested in view of the remarks and evidence of record as well as the following comments.

Independent claims 1 and 25 define methods of increasing plant seed yield which are not described or suggested by the cited combination of art. The claimed methods require transformation of plants with a nucleic acid sequence encoding a specifically recited protein and the claimed methods require a selection step wherein plants with increased plant seed yield are specifically selected for, as a requirement of the claimed method.

One of ordinary skill in the art would not have appreciated from the cited combination of art that the required transformation would lead to increased plant seed yield. Without such an appreciation, the ordinarily skilled person would not have found it obvious to have selected for increased plant seed yield, as required by the claimed invention. Withdrawal of the Section 103 rejection is requested.

The Examiner summarizes the applicants previous remarks over the cited art on pages 2-3 of the Office Action of May 20, 2011 – such as the applicants previous explanation that Basel describes an increase in growth rate but not an increase in plant seed yield – and then the Examiner again directs the applicants attention to Basel's

teaching of an increase in growth rate. See page 3 of the Office Action of May 20, 2011 and the Examiner's reproduction from pages 36-37 of Basel.

Basel's teaching of increasing growth rate in plants would not have led one of ordinary skill to expect an increase in plant seed yield or to selection of increased plant seed yield, as required by the presently claimed invention.

Moreover, the passage reproduced by the Examiner from pages 36-37 of Basel concerns the speed of growth rather than yield. Specifically, the advantage taught by Basel (i.e., "advantage in growth rates") is the reduction in the levels of toxic cations in growing plant cells due to the existence of metal binding proteins.

The Examiner also refers to page 2, lines 11-23; page 9, lines 7-14; page 35, lines 6 to page 37, line 12 and to SEQ ID NO: 7, on page 3 of the Office Action of May 20, 2011, where the Examiner believes that Basel teaches a method for making a plant with "increased growth and development", comprising introducing and overexpressing a nucleic acid sequence encoding a metallothionein, and wherein the nucleic acid is expressed under a constitutive promoter. The Examiner is requested to identify a passage of Basel describing making a plant with "increased growth and development".

Page 2, lines 11-23 of Basel describes the following as the "FIELD OF THE INVENTION":

> The increase in growth rate varies among different plants and crops and is further dependent upon local growing conditions and the cultivar of the plant. However, plants and crops containing the growth enhancing gene sequences of the present invention will show significant increases in growth rates or in crop yields when compared under identical growing conditions to the same plants or crops not containing these gene sequences. Although these increased

> crop yields are possible without additional fertilizers, nutrients or water, in some cases the addition of a source of specific nutrients to the soil can augment the effect of these growth enhancing genes.

Page 9, lines 7-14 of Basel describes the following:

> Initially, the inventors believed that metallothionein would allow for the development of plants that stored heavy metals and that these plants would be useful as mineral supplements and for bioremediation. Plants that acquire heavy metals from the soil and transport them into the plant tissue are said to remediate the contaminated soil. Unexpectedly, even the heavy metal sinking plants also grew faster. In addition, a

Page 35, line 6 of Basel describes the following:

> Metal Binding Proteins

Page 37, line 12 of Basel describes the following:

> the invention in any manner.

The cited passages of Basel fail to describe a method for making a plant with "increased growth and development", comprising introducing and overexpressing a nucleic acid sequence encoding a metallothionein, and wherein the nucleic acid is expressed under a constitutive promoter, as asserted by the Examiner.

Basel demonstrates, such as in Examples 1-4, the expression of metallothionein in combination with other genes and, it appears, an increase in growth rate, i.e. speed of growth. There is no description in Basel of any increase in yield.

Further, at best, Basel teaches that the carbonic anhydrase gene and, in particular the carbonic anhydrase II gene, were found to have the greatest affect on

increasing plant growth (see page 10, lines 27-30 ("in particular, the carbonic anhydrase I1 gene, was found to have the greatest affect on increasing plant growth.").

There is no suggestion in Basel or in the combination of Basel and Zhou to make the presently claimed invention.

The Examiner also refers to Zhou et al. for teaching an Arabidopsis type 2 metallothionein protein (MT2a) as having 100% sequence identity to SEQ ID NO: 2.

The Examiner states on page 4 of the Office Action dated May 20, 2011, that expression of metallothionein proteins are differentially regulated and that MT2a is overexpressed in leaves and inflorescence.

Zhou does not demonstrate or suggest however a causal link between the natural expression patterns displayed Figure 6 of Zhou et al. and the increased seed yield as required by the presently claimed invention. The presently claimed invention would not have been obvious from the combination of cited art.

Assuming that higher natural expression levels in particular parts of the plant are indicative of increased seed yield, the applicants submit that in such case a person of ordinary skill in the art would not have selected MT2a as target gene. Rather, one of ordinary skill will appreciate that roots and leaves are the most important plant organs that contribute to plant growth. Therefore, based on the expression patterns shown in Fig. 6 of Zhou, MT1 would be a better candidate than MT2a, because even in leaves the expression level of MT1 is higher compared to MT2a.

As already demonstrated in the applicants remarks of December 22, 2008, this reasoning does not hold true. Increased expression of MT1 did not result in increased

seed yield. Furthermore, seeds develop in the siliques; inflorescences are not relevant in this context as they relate to flowers. Therefore, an ordinarily skilled person aiming to increase seed yield would not look to flowers, but rather would focus on the organs that directly affect seed development, i.e. the siliques.

Again, assuming that higher natural expression levels in particular parts of the plant are indicative of increased seed yield, an ordinarily skilled person would have given preference to MT2b over MT2a as the expression level in siliques is higher for MT2b compared to MT2a. Therefore, following the reasoning of the Examiner, an ordinarily skilled person would have been dissuaded from selecting the MT2a gene of Zhou.

The claimed invention would not have been obvious in view of the cited combination of art.

The applicants again submit that an increased growth rate taught by Basel would not have led one of ordinary skill in the art to have made the claimed method of increasing plant seed yield. Growth rate may occur at certain stages in the life cycle of a plant or throughout the entire plant life cycle. However, one of ordinary skill will appreciate that even if the growth rate increase described by Basel were to take place throughout the whole of the life cycle of a plant of Basel, which is not a certainty, one of ordinary skill would not have expected an increase in seed yield.

Some genes when overexpressed in a plant may lead to increased biomass and increased seed yield. Other genes, when expressed in a plant, may lead to decreased biomass and increased seed yield and some genes may even result in plants having

increased biomass and no seed yield. Whether a gene is suitable for increasing seed yield in plant is not predictable on the basis of any effect a gene may have on plant biomass or growth rate. It could not be predicted from a reference which describes the use of metallothionein for increasing growth rate in plants whether the same gene would be useful for increasing seed yield in plants. Yield may be manifested in various forms and there are some genes which may alter seed size and some which may alter the seed number and some may affect both seed size and seed number. These different yield parameters are often influenced through different internal plant mechanisms. Therefore, the claimed invention would not have been predictable from the combination of cited art.

Withdrawal of the Section 103 rejection is requested.

The claims are submitted to be in condition for allowance and a Notice to that effect is requested. The Examiner is requested to contact the undersigned, preferably by telephone, in the event anything further is required.

Respectfully submitted,

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